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**Environmental Stewardship—
Environmental Characterization and Remediation**

Standard Operating Procedure

for **Field Decontamination of Drilling
and Sampling Equipment**

☒ **NES Approved**

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0	03/31/95	Charles Wilson	New Procedure	All
1	04/27/01	Rick Haaker	Minor editorial changes to improve readability, updated references and format	All
2	12/8/05	John Wilcox	Removed statement that suggests borehole material may be returned to borehole for disposal. Revised to comply with current procedure format template and update organizational titles.	All

Field Decontamination of Drilling and Sampling Equipment

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List of Acronyms and Abbreviations

ECR	Environmental Characterization and Remediation Group
ENV	Environmental Stewardship Division
ERS	Environmental Remediation and Surveillance Program
FTL	field team leader
LANL	Los Alamos National Laboratory (or the Laboratory)
LIR	Laboratory Implementation Requirement
NMED	New Mexico Environment Department
PPE	personal protective equipment
PL	project leader
QMP	quality management plan
QP	quality procedure
QPPL	Quality program project leader
RCT	Radiological Control Technician
RPF	Records Processing Facility
SSHASP	Site-Specific Health and Safety Plan
SME	subject matter expert
SOP	standard operating procedure
WCSF	Waste Characterization Strategy Form

Field Decontamination of Drilling and Sampling Equipment

1.0 PURPOSE

This standard operating procedure (SOP) states the responsibilities and describes the process for the general field decontamination of drilling and sampling equipment within the Los Alamos National Laboratory (LANL or the Laboratory) Environmental Stewardship (ENV) Division - Environmental Characterization and Remediation (ECR) Group. This procedure integrates the criteria of the "Environmental Stewardship – Environmental Remediation and Surveillance (ERS) Quality Management Plan," hereinafter referred to as the Quality Management Plan (QMP).

2.0 SCOPE

This SOP is a mandatory document and will be implemented by all ECR personnel when performing decontamination of drilling and sampling equipment.

Note: Subcontractors performing work under the ECR quality program shall follow this SOP for decontaminating drilling and sampling equipment or may use their own procedure(s) as long as the substitute meets the requirements prescribed by the ERS Program Quality Management Plan, and is approved by the ECR Quality Program Project Leader (QPPL) before the commencement of the designated activities.

3.0 TRAINING

- 3.1 **Participants** shall train to (e.g., read and/or classroom) and use the current version of this SOP; contact the author of this SOP if the text is unclear.
- 3.2 **Participants** using this SOP shall document training in accordance with QP-2.2, "Personnel Training Management," using the training documentation link at the end of this document if they possess a CRYPTOCARD and administrative authority to the Laboratory, employee development system (EDS), or using the Training Documentation Form located in the forms section of the ENV-ECR web page.
- 3.3 The **Field Team Leader (FTL)** will ensure that field team members who are engaged in the collection of characterization samples for the ERS Program are familiar with sampling equipment field decontamination objectives and procedures. This would include personnel who are collecting environmental media samples using hand tools, mechanical drilling and sampling equipment, or excavation equipment.

- 3.4 The responsible **project leader (PL)** shall monitor the proper implementation of this procedure.
- 3.5 The **FTL** shall monitor the proper implementation of this procedure and ensure that relevant team members have completed all applicable training assignments in accordance with QP-2.2.
- 3.6 **Participants** may request any needed assistance with implementation of this procedure from the ECR Quality Integration and Improvement (QII) team.

4.0 DEFINITIONS

Note: Definitions are specific to this procedure.

- 4.1 Container — A portable device in which a material is stored, transported, treated, disposed of, or otherwise handled.
- 4.2 Cross contamination — The inadvertent introduction of contaminated materials from one location to another.
- 4.3 Site-Specific Health and Safety Plan (SSHASP)—A health and safety plan that is specific to a site or ECR-related field activity that has been approved by an ECR health and safety representative. This document contains information specific to the project including scope of work, relevant history, descriptions of hazards by activity associated with the project site(s), and techniques for exposure mitigation (e.g., personal protective equipment [PPE]) and hazard mitigation.

5.0 RESPONSIBLE PERSONNEL

The following identifies the personnel responsible for actions in this procedure:

- 5.1 Field Team Leader
- 5.2 Participants
- 5.3 Project Leader
- 5.4 Site Safety Officer
- 5.5 Radiological Control Technician

6.0 BACKGROUND AND PRECAUTIONS

Note: This SOP is to be used in conjunction with an approved Site-Specific Health and Safety Plan (SSHASP). Also, consult the SSHASP for information on and use of all personal protective equipment (PPE).

- 6.1 To help ensure that samples collected for the purpose of characterizing a potentially contaminated site are representative of the point place where they are collected, the equipment used to collect those samples should be

decontaminated between each sampling event. Decontamination helps minimize the potential for cross contamination between sampling locations and helps protect site and community personnel by requiring that equipment not be removed from the site without proper decontamination. The decontamination process should be tailored to the types of contaminants anticipated. The volume of decontamination wastes generated should be kept at a minimum.

- 6.2 This procedure addresses decontamination for both radioactive and hazardous chemical constituents. A dry decontamination process is used first for the primary purpose of removing soil that may be contaminated by radioactive and/or hazardous constituents, followed by a wet decontamination process intended to remove the remaining constituents. Dry decontamination is essentially the mechanical and/or chemical cleaning of the equipment without the excessive use of liquids. Dry decontamination is used first to minimize liquid waste production, especially the production of liquid mixed wastes. The solid waste produced by the dry decontamination process, however, may contain both radioactive and hazardous chemical constituents and become a mixed waste. Wet decontamination is essentially a washing process to remove constituents that are not removed by the dry decontamination process.
- 6.3 In the interest of waste minimization, refer to Sections 6.3 and 6.4 of SOP-01.06, Management of Environmental Restoration Project Waste, to determine whether extraneous soils removed by mechanical means can be returned to the site of origin; however, no material should be returned directly to the borehole from which it came. Wastes generated from drilling operations should be managed according to SOP-01.06 (pursuant to the NMED Order on Consent.)
- 6.4 Decontamination procedures shall be conducted in accordance with the applicable SSHASP to help ensure that personnel performing the decontamination are protected from equipment-related accidents and from exposures to radioactive, hazardous, and/or mixed wastes. Implementation of these procedures may involve steam cleaning of drilling, excavation, and sampling equipment.

7.0 EQUIPMENT

- 7.1 A checklist of suggested equipment and supplies needed to implement this procedure is provided in Attachment A, Equipment and Supplies Checklist for Field Decontamination of Drilling and Sampling Equipment.
- 7.2 **Participants** shall use only the equipment and supplies authorized by the responsible PL and included on the equipment and supply checklist for this procedure.

- 7.3 **Participants** shall report to the PL any equipment or supply item listed on the checklist that is not available for use and the need for equipment or supply items in addition to or different from the equipment and supplies listed on the checklist.

8.0 PROCEDURE

Note: Deviations from SOPs are made in accordance with QP-4.2, Standard Operating Procedure Development and documented in accordance with QP-5.7, Notebook Documentation for Environmental Restoration Technical Activities and/or SOP-01.01, General Instructions for Field Investigations.

Optional approaches for decontamination are presented below to provide flexibility to the FTL in addressing site-specific situations. For general decontamination guidance refer to ASTM D 5608-94 (radioactive sites) and ASTM D 5088-90 (other sites).

Note: **Participants** may produce paper copies of this procedure printed from the controlled-document electronic file located at http://erinternal.lanl.gov/home_links/Library_proc.htm. However, it is each person's responsibility to ensure that they have trained to and utilize the current version of this procedure. The author may be contacted if the text is unclear.

8.1 Decontamination Areas

8.1.1 Decontamination areas shall be established to provide "dry" and/or "wet" decontamination, depending on the decontamination needs at the site.

8.1.2 The dry decontamination area is used to remove loose, contaminated soil adhering to the equipment. This area may be located where the drilling or excavation is taking place to minimize the potential for spreading contaminants from the site. If contamination is potentially extensive or if environmental factors such as wind may cause uncontrolled dispersal of potentially contaminated soil or other substances, decontamination may be conducted, at the discretion of the **FTL**, within an open-top solids containment vessel. Before decontamination, clean plastic sheeting should be placed on the ground or inside the solids containment vessel to collect material removed from the equipment. Waste material removed from the equipment should be managed as specified in SOP-01.06. An equipment table, covered with clean plastic sheeting, may be placed near the dry decontamination area to facilitate disassembly of the contaminated sampling equipment. Drums may be placed nearby to contain waste material.

- 8.1.3 The wet decontamination area is used to remove contaminants that were not removed during dry decontamination. The wet decontamination area equipment varies depending upon the nature, size and complexity of the sampling operation and of the equipment to be decontaminated. For sampling tasks involving drilling or excavating equipment, the wet decontamination area must have a liquid containment vessel, and may involve a high-pressure steam cleaner, a pump to transfer liquid wastes, and drums or other containers with liners for storing liquid wastes. The drums or containers should have secondary containment. An equipment table, covered with clean plastic sheeting, may be placed next to the wet decontamination area to facilitate re-assembly and wrapping of the decontaminated equipment pending further use. For sampling tasks using hand augers or other small equipment, the wet decontamination area may consist of tubs, buckets, brushes and spray bottles. Separate buckets or tubs shall be used for washing and rinsing this equipment. The use of spray bottles for rinsing minimizes the generation of water that must be collected for disposal.
- 8.1.4 The decontamination area should be placed downwind of site personnel whenever possible, giving consideration to the anticipated contaminants, detection of airborne contaminants above background, wind and weather conditions, and other site considerations such as site layout, access, and other site activities. Where possible, the decontamination area should not be located downwind of dust-producing site operations that could contaminate the equipment. The decontamination area may be located adjacent to the designated and secured drum storage area to reduce the need to move drums around the site.
- 8.1.5 The decontamination of equipment that is to be removed from a contaminated area to a controlled or uncontrolled area shall be performed with the approval and oversight of the **Site Safety Officer**. Decontaminated equipment shall be screened by a **Radiological Control Technician (RCT)**, or designee, before release if radiation is potentially present at the sampling site. The radiological screening may include swipe and/or smear surveys as well as direct instrument surveys. If radiological screening conducted before wet decontamination shows that no radioactive contamination is present, a second radiological screening following wet decontamination is not required.

8.2 Drilling/Excavation Equipment Decontamination

In general, this section applies to drilling equipment and other hardware that goes down a borehole. It includes drill pipe, well casing, well development pumps, bailers, geophysical tools, rods, augers, and drill bits. Decontamination pads for these items need to be sufficiently large to do the job. Such items should be placed on a sawhorse or rack for inspection and decontamination.

Note: Steam cleaning should not take place directly behind a drill rig; this might create a slip/trip hazard.

8.2.1 Before commencing sampling operations for a project, those parts of the drilling or excavation equipment that will come in contact with the sampled media shall be screened for radiological contamination and volatile organics. If soil adhering to the equipment is found to be contaminated during the field screening, dry decontamination shall be performed as described in Section 8.2.2 below. If hazardous chemicals or residual radioactive contaminants are potentially present, dry decontamination shall be followed by wet decontamination as described in Section 8.2.3 below. In addition, a visual inspection should be performed of the entire piece of equipment and gross residuals such as dirt from previous operations may be removed at the discretion of the **FTL** if it could affect the objectives of the sampling operation or has the potential of falling from the equipment and contaminating the site.

8.2.2 If contamination is suspected or found on the surface of the equipment, or in the soil on the equipment, that piece of equipment shall be decontaminated in the dry decontamination area. The coarse contaminated material may be gently removed using a steel brush, and the more cohesive material may be removed with a flat scraper such as a wooden spatula or paint stirring stick. A water spray bottle may be used to lightly moisten dry soil being removed from the equipment to control dust. Only the minimum amount of water spray should be used to keep the waste moisture content low.

8.2.2.1 After the coarse contaminated material has been removed, remaining contamination may be removed by washing with Fantastik™ (an alkaline, waxless household cleaner) and/or Radiac™ (a commercial cleaner for removing radioactive particles), or similar product, followed by air drying or other appropriate methods. If radioactive contaminants are present, the equipment may be periodically surveyed with hand-held radiation detectors

during the course of decontamination to determine where contaminated areas are located. Upon completing the decontamination process, swipe and/or smear samples may be collected from the equipment at the discretion of the **RCT, or designee**, or as required by Laboratory Implementation Requirement (LIR) 402-700-01.0, Occupational Radiation Protection Requirements, and either submitted to a laboratory for radiological analysis or counted on site if appropriate portable equipment is available.

8.2.3 If hazardous and/or residual radioactive contamination is still present after dry decontamination, a wet decontamination process shall be used. The liquid containment vessel should be empty at the start of each wet decontamination campaign, especially if the previous wet decontamination did not require a methanol rinse, so that the volume of wastes generated by the decontamination process can be minimized.

8.2.3.1 In general, a non-phosphate detergent and water wash with a water rinse is adequate for most decontamination requirements. Alternatively, the contaminants may be removed by steam cleaning, by washing with AlconoxTM detergent, or by another appropriate method, followed by a water wash using a standard scrub brush. The equipment shall then be rinsed with clean water. A second rinse should be performed using distilled or deionized water, particularly in cases where the chemistry of the water supply is not monitored on a regular basis. Where trace metals are anticipated, an acidic rinse may follow the detergent wash and rinse in the decontamination process to remove the trace metals, followed by a distilled or deionized water rinse.

8.2.3.2 If organic contaminants are expected, a rinse with a solvent such as methanol may follow the detergent wash and rinse to remove the organics. If used, the solvent shall either be wiped off or allowed to evaporate completely, and shall be followed by a water rinse. Methanol, solvent, and acid contaminated waste shall be segregated and managed in accordance with SOP-01.06, Management of Environmental Restoration Project Waste. Before using an acid or solvent, confirmation is required that the particular acid or solvent used is not a contaminant of concern at the site. These waste streams must be approved in a Waste

Characterization Strategy Form (WCSF) prior to generation. Decontamination rinsate containing solvents or acids may need to be analyzed for pH and/or ignitability tests prior to disposal.

- 8.2.3.3 The equipment is then allowed to air dry or is dried with clean rags, towelettes, paper towels, or by other appropriate methods. Only those parts of the equipment that come into direct contact with the potentially contaminated media need to be decontaminated in this manner. If an equipment (rinsate) blank is required by the governing sampling and analysis plan or quality assurance project plan, a deionized water rinsate should be collected in accordance with SOP-01.05, Field Quality Control Samples, following completion of the decontamination process.
- 8.2.4 At the discretion of the **FTL**, decontaminated drilling and excavating equipment not in active use, such as hollow-stem auger sections, drill rods, down-hole hammers, and bits, may be wrapped in plastic or otherwise protected from dirt and dust until needed.
- 8.2.5 In the event that radioactive contamination is fixed on the equipment surface and cannot be removed using these field decontamination procedures, the **FTL** shall wrap the equipment in clean plastic sheeting or otherwise isolate it from cross contamination, label the equipment according to the **RCT's** instructions, and set the equipment aside pending a decision to conduct further decontamination at a decontamination facility or to dispose and replace the equipment.
- 8.2.6 The successful decontamination of radiologically contaminated equipment shall be verified by the **RCT** using field survey techniques. The equipment is considered radioactively clean and suitable for sampling use if it meets the acceptance criteria for release from the Laboratory property specified in LIR 402-700-01.0.
- 8.2.7 Following the initial decontamination, the drilling or excavation equipment is typically not decontaminated again until completion of the specific borehole or excavation, unless cross contamination within a single borehole or excavation is of concern. The need to decontaminate during drilling or excavation may be determined by the **FTL** from field screening or may be indicated in drilling plans, excavation plans, or other work plans. The internal surfaces of augers have the potential to come in contact with contaminated soil and should be screened periodically before demobilization.

- 8.2.8 Drilling equipment shall be decontaminated using appropriate methods for the type of contamination potentially present before mobilizing at another site. The equipment shall be surveyed with hand-held instruments capable of detecting residual radioactive material at levels low enough to detect the radiological constituents of concern. Swipe and/or smear samples may be collected from the equipment at the discretion of the **RCT**, or designee, or as required by LIR 402-700-01.0, and either submitted to a laboratory for radiological analysis or counted on site if appropriate portable equipment is available. Decontamination shall be conducted as described in Sections 8.2.2 and 8.2.3 above. In addition, a visual inspection should be performed on each piece of equipment, as described in Section 8.2.1.
- 8.2.9 Contaminated soil shall be removed from the dry decontamination area following each decontamination campaign and disposed of in accordance with SOP-01.06, Management of Environmental Restoration Project Waste.
- 8.2.10 Water in the liquid containment vessel shall be removed from the vessel following each decontamination campaign and disposed of in accordance with SOP-01.06.
- 8.2.11 Equipment decontamination personnel shall follow the requirements of the SSHASP when removing PPE. Rags, plastic, PPE, etc. shall be disposed of in accordance with SOP-01.06.
- 8.2.12 Upon completion of site sampling and decontamination activities, the decontamination area shall be secured.
- 8.3 Sampling Equipment Decontamination
- 8.3.1 Both sample collection and sample preparation equipment are decontaminated according to the procedure described in this section.
- 8.3.2 After sampling equipment has been used to collect each sample, the equipment and sample shall be screened with hand-held radiation detectors to evaluate personnel safety and radioactive contamination. If safe, the sampling equipment shall then be disassembled, as appropriate to the type of equipment, on a clean surface such as a clean plastic sheet. The sample shall be removed (except in the case of Shelby tubes) and processed according to the appropriate SOP. If Shelby tubes are used to collect samples, the sample is generally left inside the tube during shipment; in such cases, the outside of the tube should be screened before shipment and decontaminated as required.

- 8.3.3 If the radiological screening indicates that the sampling equipment is radiologically contaminated after the sample is removed, the equipment shall be decontaminated as described in Section 8.2.2 and 8.2.3. In the event that radiological contamination is fixed on the equipment surface and cannot be removed using these field decontamination procedures, the process described in Section 8.2.5 shall be followed.
- 8.3.4 If hazardous contamination is potentially present, the equipment shall be decontaminated as described in Section 8.2.2 and 8.2.3. If an equipment (rinsate) blank is required, it should be collected in accordance with the instructions in Section 8.2.3.
- 8.3.5 Decontaminated sampling equipment not in active use should be protected from dirt and dust (e.g. wrap in foil or plastic) and segregated from contaminated equipment until needed.
- 8.3.6 Minimizing the amount of sampling equipment used during sampling activities will minimize the time required for decontamination as well as the generation of wastes. Segregation of solid and liquid decontamination wastes is emphasized in this procedure to minimize the volume of liquid wastes generated. Refer to SOP-01.06.
- 8.3.7 Sample preparation equipment used to collect sub-samples that will constitute a single composite sample does not need to be decontaminated between each sub-sample collection.
- 8.3.8 If the rinsate in the liquid containment vessel includes methanol, it should be transferred to a separate lined drum before additional methanol-free decontamination to minimize cross contamination and potentially mixed waste generation. In order to allow for expansion, drums should not be overfilled. Methanol-soaked rags or towelettes should be bagged and placed into a separate lined drum. Methanol contaminated waste shall be segregated and managed in accordance with SOP-01.06. Methanol decontamination wastes must be approved in a WCSF prior to generation. Waste containers shall be labeled and handled in accordance with SOP-01.06.
- 8.3.9 Equipment decontamination personnel shall follow the requirements of the SSHASP when removing PPE. Rags, plastic, PPE, etc. shall be bagged, drummed, labeled and handled as described in SOP-01.06.

9.0 LESSONS LEARNED

- 9.1 Before performing work described in this SOP, **participants** should go to the Department of Energy Lessons Learned Information Services home page, located at <http://www.tis.eh.doe.gov/ll/ll.html>, and/or to the LANL Lessons Learned Resources web page, located at http://www.lanl.gov/projects/lessons_learned/, and search for applicable lessons.
- 9.2 During work performance and/or after the completion of work activities, **participants**, as appropriate, shall identify, document, and submit lessons learned in accordance with the LANL, Lessons Learned System located at http://www.lanl.gov/projects/lessons_learned/.

10.0 RECORDS

The **FTL** is responsible for submitting the following records (processed in accordance with QP-4.4, Record Transmittal to the Records Processing Facility) to the Records Processing Facility.

- 10.1 Training documentation checklist
- 10.2 Field notebook
- 10.3 Daily Activity Log (SOP-01.01)

Note: General decontamination activities shall be documented in the daily activity log or field notebook. Should deviations in conditions or problems occur, they should be noted in the daily activity log or field notebook per SOP-01.04.

11.0 REFERENCES

To implement this procedure properly, **participants** should become familiar with the contents of the following documents, available at http://erinternal.lanl.gov/home_links/Library_proc.shtml:

- “Quality Management Plan”
- QP-2.2, Personnel Orientation and Training
- QP-4.2, Standard Operating Procedure Development
- QP-4.4, Record Transmittal to the Records Processing Facility
- QP-5.7, Notebook Documentation for Environmental Restoration Technical Activities
- SOP-01.01, General Instructions for Field Investigations
- SOP-01.04, Sample Control and Field Documentation
- SOP-01.05, Field Quality Control Samples

- SOP-01.06, Management of Environmental Restoration Project Wastes
- LIR 402-700-01.0, Occupational Radiation Protection Requirements
- ASTM, "Standard Practice for Decontamination of Field Equipment Used at Nonradioactive Waste Sites, ASTM D 5088-90", American Society for Testing and Materials, 1990
- ASTM, "Standard Practice for Decontamination of Field Equipment Used at Low Level Radioactive Waste Sites, ASTM D 5608-94," American Society for Testing and Materials, 1994
- U.S. Department of Energy, 1987, "Appendix G: Decontamination Guidance," in *The Environmental Survey Manual*, Report DOE/EH-0053. Washington, D.C.

12.0 ATTACHMENTS

Participants may locate all example forms associated with this procedure at <http://erinternal.lanl.gov/Quality/user/forms.asp>.

Attachment A: Equipment and Supplies Checklist for Field Decontamination of Drilling and Sampling Equipment (1 page)

[Using a "CRYPTOCARD," click here to record "self-study" training to this procedure.](#)

If you do not possess a "CRYPTOCARD" or encounter problems, contact the ENV-ECR training specialist.

Equipment and Supplies Checklist for Field Decontamination of Drilling and Sampling Equipment

- | | |
|---|---|
| <p>_____ high-pressure portable steam cleaner</p> <p>_____ liquid containment vessel and support rack</p> <p>_____ buckets, tubs, plastic wading pools, as needed</p> <p>_____ solids containment vessel and support rack shovel</p> <p>_____ electrical generator (if power source is not available) and fuel</p> <p>_____ power cord (to connect steam cleaner to generator)</p> <p>_____ two sturdy equipment tables for tool assembly and disassembly</p> <p>_____ portable liquids pump and 10' (minimum) discharge hose</p> <p>_____ steel brushes and standard scrub brushes</p> <p>_____ Alconox detergent or equivalent + acid solution if required by the FSP</p> <p>_____ pesticide-grade methanol + acid solution if required by the FSP</p> <p>_____ potable water (from an approved source with known chemistry) for steam cleaning</p> <p>_____ organic-free distilled deionized water</p> <p>_____ garden-type sprayer for deionized and potable water, and water "squirt" bottle for methanol</p> <p>_____ Fantastik and/or Radiac wash cleansers, or equivalent</p> | <p>_____ wooden spatula or paint stirring sticks</p> <p>_____ box of clean, dry lint-free rags and/or disposable towelettes</p> <p>_____ sponges</p> <p>_____ roll of heavy plastic sheeting</p> <p>_____ heavy-duty stapler and staples</p> <p>_____ drums and liners (for liquids and solids) and covers</p> <p>_____ wooden pallets (for drums)</p> <p>_____ secondary containment for drums containing liquids</p> <p>_____ labels and marking pens</p> <p>_____ one gallon sealable plastic bags</p> <p>_____ plastic trash bags</p> <p>_____ paper towels</p> <p>_____ duct tape</p> <p>_____ bound field log books and ink pens</p> <p>_____ Any PPE listed or required in the SSHASP</p> <p>_____ Any additional supplies listed in associated procedures, as needed</p> <p>_____ Saw horses or racks for drill stem and other drilling hardware</p> <p>_____</p> <p>_____</p> <p>_____</p> |
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CST-17 (665-4000) can provide 55-gallon drums, labels, plastic liners, and covers, or these items can be obtained from stock.

SOP-01.08, R2

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